Verification and Validation of Numerical Models for Air/Water Flow on Coastal and Navigation Fluid-Structure Interaction Applications – PANACM 2015, in conjunction with the XI Argentine Congress on Computational Mechanics – MECOM 2015

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ABSTRACT

Performance analysis and optimization of coastal and navigation structures is becoming feasible due to recent improvements in numerical methods for multiphase flows and the steady increase in capacity and availability of high performance computing resources[1]. Now that the concept of fully three-dimensional air/water flow modelling for real world engineering analysis is achieving acceptance by the wider engineering community, it is critical to expand careful comparative studies on verification, validation, benchmarking, and uncertainty quantification for the variety of competing numerical methods that are continuing to evolve [2,3]. Furthermore, uncertainty still remains about the relevance of secondary processes such as surface tension, air compressibility, air entrainment, and solid phase (structure) modelling so that questions about continuum mechanical theory and mathematical analysis of multiphase flow are still required. Two of the most popular and practical numerical approaches for large-scale engineering analysis are the Volume-Of-Fluid (VOF) and Level Set (LS) approaches. In this work we will present a publically available verification and validation test set for air-water-structure interaction problems as well as computational and physical model results including a hybrid VOF-LS method [2], traditional VOF methods, and Smoothed Particle Hydrodynamics (SPH) results. The test set repository and test problem formats will also be presented in order to facilitate future comparative studies and reproduction of scientific results.

REFERENCES

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